

STN Search Summary

09/905212

(FILE 'HOME' ENTERED AT 14:38:49 ON 22 DEC 2005)

FILE 'MEDLINE, CAPLUS, BIOSIS, WPIDS, AGRICOLA,  
EMBASE' ENTERED AT

14:39:56 ON 22 DEC 2005

L1 9339696 S (CRYSTAL OR CRYSTALLOGRAPHY OR STRUCTURE)  
L2 3625 S ((30S RIBOSOMAL SUBUNIT) OR (SMALL  
RIBOSOMAL SUBUNIT))  
L3 14487 S ((AMINOGLYCOSIDE ANTIBIOTICS)OR  
(PAROMOMYCIN))  
L4 68902 S ((THERMUS THERMOPHILUS) OR (PROKA?))  
L5 1333 S L1 AND L2  
L6 37 S L5 AND L3  
L7 6 S L6 AND L4

=> d abs

L7 ANSWER 1 OF 6 MEDLINE on STN

AB A structural and mechanistic explanation for the  
selection of tRNAs by the  
ribosome has been elusive. Here, we report crystal  
structures of the 30S ribosomal  
subunit with codon and near-cognate tRNA anticodon  
stem loops  
bound at the decoding center and compare affinities of  
equivalent  
complexes in solution. In ribosomal interactions with  
near-cognate tRNA,  
deviation from Watson-Crick geometry results in  
uncompensated desolvation  
of hydrogen-bonding partners at the codon-anticodon  
minor groove. As a  
result, the transition to a closed form of the 30S  
induced by cognate tRNA  
is unfavorable for near-cognate tRNA unless  
paromomycin induces  
part of the rearrangement. We conclude that  
stabilization of a closed 30S  
conformation is required for tRNA selection, and  
thereby structurally  
rationalize much previous data on translational  
fidelity.


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<input type="checkbox"/>	L14	(Carter).in. AND L9	17
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<input type="checkbox"/>	L4	(Aminoglycoside antibiotics)or (paromomycin)	144696
<input type="checkbox"/>	L3	((30S ribosomal subunit) OR (small ribosomal subunit))	9267797
<input type="checkbox"/>	L2	30S ribosomal subunit OR small ribosomal subunit	9267797
<input type="checkbox"/>	L1	crystal OR crystallography OR structure	5628012

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<a href="#">#12</a> Search <b>#11 AND #10</b>		14:19:13	<a href="#">16</a>
<a href="#">#11</a> Search <b>Thermus thermophilus</b>		14:18:55	<a href="#">1549</a>
<a href="#">#10</a> Search <b>Aminoglycoside antibiotics</b>		14:18:42	<a href="#">59609</a>
<a href="#">#9</a> Search <b>#8 AND #7</b>		14:17:50	<a href="#">13</a>
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<a href="#">#6</a> Search <b>#5 AND #6</b>		14:17:07	<a href="#">0</a>
<a href="#">#5</a> Search <b>30S ribosomal subunit OR small ribosomal subunit</b>		14:16:48	<a href="#">3066</a>
<a href="#">#4</a> Search <b>crystal OR crystallography OR structure</b>		14:16:23	<a href="#">600193</a>

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Dec 19 2005 04:32:54

## Summary: Entrez Structure Search

- 1N32V      [Reports](#)      [BLink](#), [Links](#)  
Chain V, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065896|pdb|1N32|V[27065896]
- 1N32T      [Reports](#)      [BLink](#), [Conserved Domains](#), [Links](#)  
Chain T, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065895|pdb|1N32|T[27065895]
- ☐ **42:** 1N32S      [Reports](#)      [BLink](#), [Conserved Domains](#), [Links](#)  
Chain S, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065894|pdb|1N32|S[27065894]
- ☐ **43:** 1N32R      [Reports](#)      [BLink](#), [Conserved Domains](#), [Links](#)  
Chain R, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065893|pdb|1N32|R[27065893]
- ☐ **44:** 1N32Q      [Reports](#)      [BLink](#), [Conserved Domains](#), [Links](#)  
Chain Q, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065892|pdb|1N32|Q[27065892]
- ☐ **45:** 1N32P      [Reports](#)      [BLink](#), [Conserved Domains](#), [Links](#)  
Chain P, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065891|pdb|1N32|P[27065891]
- ☐ **46:** 1N32O      [Reports](#)      [BLink](#), [Conserved Domains](#), [Links](#)  
Chain O, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065890|pdb|1N32|O[27065890]
- ☐ **47:** 1N32N      [Reports](#)      [BLink](#), [Conserved Domains](#), [Links](#)  
Chain N, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched

At The First Codon Position At The A Site With Paromomycin  
gi|27065889|pdb|1N32|N[27065889]

- ☐ **48:** [1N32M](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain M, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065888|pdb|1N32|M[27065888]
- ☐ **49:** [1N32L](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain L, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065887|pdb|1N32|L[27065887]
- ☐ **50:** [1N32K](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain K, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065886|pdb|1N32|K[27065886]
- ☐ **51:** [1N32J](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain J, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065885|pdb|1N32|J[27065885]
- ☐ **52:** [1N32I](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain I, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065884|pdb|1N32|I[27065884]
- ☐ **53:** [1N32H](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain H, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065883|pdb|1N32|H[27065883]
- ☐ **54:** [1N32G](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain G, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065882|pdb|1N32|G[27065882]
- ☐ **55:** [1N32F](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain F, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched

At The First Codon Position At The A Site With Paromomycin  
gi|27065881|pdb|1N32|F[27065881]

- ☐ **56:** [1N32E](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain E, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065880|pdb|1N32|E[27065880]
- ☐ **57:** [1N32D](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain D, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065879|pdb|1N32|D[27065879]
- ☐ **58:** [1N32C](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain C, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065878|pdb|1N32|C[27065878]
- ☐ **59:** [1N32B](#) [Reports](#) [BLink](#), [Conserved Domains](#), [Links](#)  
Chain B, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit Bound To Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The First Codon Position At The A Site With Paromomycin  
gi|27065877|pdb|1N32|B[27065877]
- ☐ **60:** [1N36V](#) [Reports](#) [BLink](#), [Links](#)  
Chain V, Structure Of The Thermus Thermophilus 30s Ribosomal Subunit In The Presence Of Crystallographically Disordered Codon And Near-Cognate Transfer Rna Anticodon Stem-Loop Mismatched At The Second Codon Position  
gi|27065976|pdb|1N36|V[27065976]

J Mol Biol. 2002 Jul 19;320(4):883-97.

Nature. 2000 Sep 21;407(6802):327-39.

Comment in:

Nature. 2000 Sep 21;407(6802):306-7.

Structure of the 30S ribosomal subunit.

Wimberly BT, Brodersen DE, Clemons WM Jr, Morgan-Warren RJ, Carter AP, Vonnrhein C, Hartsch T, Ramakrishnan V.

MRC Laboratory of Molecular Biology, Cambridge, UK.

Genetic information encoded in messenger RNA is translated into protein by the ribosome, which is a large nucleoprotein complex comprising two subunits, denoted 30S and 50S in bacteria. Here we report the crystal structure of the 30S subunit from *Thermus thermophilus*, refined to 3 Å resolution. The final atomic model rationalizes over four decades of biochemical data on the ribosome, and provides a wealth of information about RNA and protein structure, protein-RNA interactions and ribosome assembly. It is also a structural basis for analysis of the functions of the 30S subunit, such as decoding, and for understanding the action of antibiotics. The structure will facilitate the interpretation in molecular terms of lower resolution structural data on several functional states of the ribosome from electron microscopy and crystallography.

PMID: 11014182 [PubMed - indexed for MEDLINE]

Nature. 2000 Sep 21;407(6802):340-8.

Comment in:

Nature. 2000 Sep 21;407(6802):306-7.

Functional insights from the structure of the 30S ribosomal subunit and its interactions with antibiotics.

Carter AP, Clemons WM, Brodersen DE, Morgan-Warren RJ, Wimberly BT, Ramakrishnan V.

MRC Laboratory of Molecular Biology, Cambridge, UK.

The 30S ribosomal subunit has two primary functions in protein synthesis. It discriminates against aminoacyl transfer RNAs that do not match the codon of messenger RNA, thereby ensuring accuracy in translation of the genetic message in a process called decoding. Also, it works with the 50S subunit to move the tRNAs and associated mRNA by precisely one codon, in a process called translocation. Here we describe the functional implications of the high-resolution 30S crystal structure presented in the accompanying paper, and infer details of the interactions between the 30S subunit and its tRNA and mRNA ligands. We also describe the crystal structure of the 30S subunit complexed

with the antibiotics paromomycin, streptomycin and spectinomycin, which interfere with decoding and translocation. This work reveals the structural basis for the action of these antibiotics, and leads to a model for the role of the universally conserved 16S RNA residues A1492 and A1493 in the decoding process.

PMID: 11014183 [PubMed - indexed for MEDLINE]